

## CLAIMS

What is claimed is:

1 1. A method, comprising determining a schedule for transmission times of various segments  
2 of digital content across multiple channels so as to permit any number of content consumers  
3 to begin playback of said segments of digital content from an origination point thereof within  
4 a waiting time of a request for such playback.

1 2. The method of claim 1 wherein the various segments of digital content together comprise  
2 a movie.

1 3. The method of claim 2 wherein the schedule is determined according to an earliest-  
2 deadline-first (EDF) process.

1 4. The method of claim 3 wherein in the EDF process a next transmission time for one of the  
2 various segments of digital content is determined by first finding an earliest deadline amongst  
3 a list of current deadlines for each of the various segments and selecting this segment for  
4 transmission.

1 5. The method of claim 4 wherein the earliest deadline so chosen is verified to be later than a  
2 finishing time for a last transmitted segment.

1 6. The method of claim 4 wherein a new deadline for transmission of the selected segment is  
2 determined according to  $T + t_i + t_d$ , where T is a beginning time for the transmission of the  
3 selected segment, i is a segment number for the selected segment,  $t_i$  is the playback time of  
4 segment i and  $t_d$  is the waiting time.

- 1 7. The method of claim 2 wherein a cost function is associated with each of the various  
2 segments scheduled for transmission, and a segment with the lowest of the cost functions is  
3 selected to be transmitted next.
- 1 8. The method of claim 7 wherein the cost function comprises wasted bandwidth.
- 1 9. The method of claim 2 wherein the schedule is determined according to a just-in-time (JIT)  
2 process.
- 1 10. The method of claim 9 wherein the JIT process schedules each of the various segments  
2 for transmission as close to a transmission deadline associated with each segment as possible.
- 1 11. The method of claim 10 wherein in the JIT process, conflicts for transmissions over the  
2 multiple channels are resolved by scheduling a segment with an earlier playback time closer  
3 to its deadline for transmission than a segment with a later playback time.
- 1 12. The method of claim 10 wherein in the JIT process, the transmission deadline associated  
2 with a particular one of the segments is determined as a time equal to a current time plus a  
3 playback time for that particular one of the segments plus the waiting time.
- 1 13. The method of claim 4 wherein in the EDF process, the deadlines associated with the  
2 various segments are computed according to a process wherein conflicts for transmissions  
3 over the multiple channels are resolved by scheduling a segment with an earlier playback  
4 time closer to its deadline for transmission than a segment with a later playback time.
- 5 14. The method of claim 2 wherein the schedule is determined according to a periodic  
6 transmission process.

1 15. The method of claim 14 wherein the periodic transmission process allows a broadcast  
2 schedule for the movie to be repeated every period time, the period time being equal to an  
3 integral multiple of a length of the movie.

1 16. The method of claim 14 wherein each one of the multiple segments is allocated to a  
2 transmission queue number of a transmission schedule table according to a number of times  
3 equal to a movie period divided by the sum of the waiting time and a playback time for such  
4 one segment.

1 17. The method of claim 15 wherein all of the segments allocated to a single one of the  
2 multiple channels form a pseudo-movie, and all such pseudo-movies for all of the multiple  
3 channels are input to multiple channels of a transmission head-end.

4 18. A method, comprising:

- 5 i. dividing a multimedia presentation into sequential segments, each segment  
6 having a time length,
- 7 ii. scheduling transmission of the segments of the multimedia presentation  
8 according to a schedule computed according to a specified delay time that  
9 does not depend on the time lengths of the segments, and
- 10 iii. transmitting the segments over a broadcast network according to the schedule  
11 for each segment computed in step ii.

1 19. The method of claim 18 wherein a transmission bandwidth of multiple times that of the  
2 multimedia presentation is allocated for transmission of the segments and each segment is  
3 transmitted repeatedly based on the computed schedule.

1 20. The method of claim 18 wherein early segments are transmitted more frequently than  
2 later segments.

1 21. The method of claim 18 further comprising receiving the segments transmitted over the  
2 broadcast network, storing the segments in temporary storage, and playing back the segments  
3 as soon as the delay time has elapsed.

1 22. A method as in claim 18 wherein each of the segments is scheduled for repeated  
2 transmissions at periodic times.

1 23. A method as in claim 22 wherein the periodic times for transmission of each respective  
2 segments equals time offsets of the beginning of such respective segment plus an operator  
3 selected delay time.

1 24. A method as in claim 18 wherein segments having earlier transmission deadlines are  
2 scheduled first and as soon as possible.

1 25. A method as in claim 18 wherein segments are transmitted just-in-time as determined by  
2 respective time offsets and the specified delay.

1 26. A method as in claim 25 wherein in the case of a conflict where more of the segments are  
2 to be transmitted than allocated bandwidth allows, segments later in the presentation are  
3 scheduled to be transmitted earlier in nearest empty time slots, giving priority to earlier  
4 segments to be transmitted as closely as possible to their scheduled time slots.

1 27. A method as in claim 18 further comprising computing an overlap period between an end  
2 of a current presentation and a beginning of a next presentation, to minimize interruptions  
3 therebetween.

1 28. A server configured to generate transmission schedules for each of a number of segments  
2 of a multimedia presentation to be transmitted over a multiple channels of a broadcast  
3 network, said schedules computed according to a specified delay time that does not depend  
4 on time lengths of the segments.

1 29. The server of claim 28 wherein the transmission schedules are computed according to one  
2 of a just-in-time transmission (JIT) procedure, an earliest-deadline-first (EDF) procedure or a  
3 periodic transmission procedure.

1 30. The server of claim 29 wherein according to the EDF procedure a next segment to be  
2 transmitted is determined by first finding an earliest transmission deadline amongst a list of  
3 current transmission deadlines for each of the segments and selecting this segment for  
4 transmission.

1 31. The server of claim 29 wherein according to the JIT procedure each of the segments are  
2 scheduled for transmission as close to a transmission deadline associated with each segment  
3 as possible.

1 32. The server of claim 29 wherein according to the periodic transmission procedure each of  
2 the segments is allocated to a transmission queue according to a schedule that takes into  
3 account a period of the presentation, the delay time and a playback time for each segment.

1 33. A receiver configured to receive segments of multimedia presentation from multiple  
2 transmission channels simultaneously and to begin playback of the segments in a sequence  
3 corresponding to a proper format for the multimedia presentation after a predetermined delay  
4 time that is independent of time lengths of the segments.

1 34. The receiver of claim 33 wherein the segments are stored on a local storage medium.

1 35. The receiver of claim 33 wherein the segments are received according to a schedule that  
2 was computed according to one of a just-in-time transmission (JIT) procedure, an earliest-  
3 deadline-first (EDF) procedure, a combination of aspects of the EDF and JIT procedures, or a  
4 periodic transmission procedure.